Marine Physical Laboratory

Undersea Noise in Full Spectrum Processing

W. S. Hodgkiss

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Undersea Noise in Full Spectrum Processing

William S. Hodgkiss

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Abstract

Analysis of acoustic data from SWellEx-1 shows substantial space-time variability of the shallow ambient noise field. This variability resulted from shipping traffic variations as well as a significant fluctuating component due to biologics at night. Experience with the analysis of SWellEx-1 data significantly influenced the planning for SWellEx-3 which was carried out in the same area.

Research Objective

The objective of this project was to conduct experimental work and carry out analysis of shallow water acoustic data in an effort to understand the characteristics of shallow water ambient noise.

Research Summary

Although deep water ambient noise has been the subject of a number of studies, little attention has been focused on characterizing the shallow water ambient background. This is a region heavily influenced by local shipping traffic and biologics. Thus, there are substantial short-term and

seasonal variations of the noise field. The project had two primary thrusts.

First, short-term (minutes) and long-term (hours) analysis of SWellEx-1 ambient noise data was performed. SWellEx-1 (Shallow Water evaluation cell Experiment #1) was carried out in August 1993 west of Point Loma in approximately 200 m water. Data were collected from both a vertical water column array and a two-dimensional seafloor array. Shipping noise varied substantially during this period due to variations in traffic patterns (day-to-day and day-to-night during the week as well as weekday-to-weekend). In addition, a substantial increase in the ambient noise due to biologics (croakers) was observed throughout the night which had a short-term, periodic or pulsating characteristic. The analysis of SWellEx-1 data is reported in [1-3].

Second, MPL participated in the planning of SWellEx-3, provided support during the experiment, and distributed the data from the NRaD SWSS (Shallow Water Sensor String) array after the experiment. SWellEx-3 (Shallow Water evaluation cell Experiment #3) was carried out in the same location as SWellEx-3 in July-August 1994. In addition to the 64-element MPL vertical water column array deployed from the R/P FLIP, NRaD deployed a long horizontal line array (SWSS) which was cabled back to shore [4]. At the conclusion of SWellEx-3, MPL transcribed the SWSS data into a common data format and distributed it to other participants in the experiment (specifically, to Dr. R. Heitmeyer at NRL-DC and Dr. J. Newcomb at NRL-SSC). A quick-look analysis of the SWSS data was performed and is reported in [5].

As a final note, since the SWSS array was cabled back to shore, it was available for data recording beyond the period covered by SWellEx-3. An extended period of data recording was carried out in December 1994 and January 1995. During this period, several storms moved through the area providing observations of shallow water ambient noise during both calm and rainy conditions. A quick-look analysis of the data is reported in [6].

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